Social insurance competition between Bismarck and Beveridge[1]

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Abstract

Social insurance schemes di¤er according to the relationship between contributions and bene…ts. Bismarckian systems provide earnings-related bene…ts, while Beveridgean systems o¤er ‡at payments. The conventional wisdom is that with factor mobility poor people have incentives to move towards Beveridgean countries. Consequently, Beveridgean regimes would not be sustainable under economic integration. This paper studies the validity of such a conjecture within a simple model. It is shown that mobility does have a signi…cant impact on social protection. However, the equilibrium patterns that can emerge are more complex and diversi…ed than the initial conjecture suggests. In some cases, the equilibrium may even imply that all the poor move to the Bismarckian country.

JEL Classi…cations: H23, H70

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1 Introduction

Economic integration is often perceived as a threat to national redistributive policies. This allegation is widespread, in particular within the context of European construction. It does not only concern tax and transfer policies per se, but extends to social insurance systems at least as long as they involve some redistribution.[1]

Political scientists tend to classify social protection systems according to the relation between contributions and bene…ts. They distinguish three economic systems on the basis of their bene…t rules.[2] The …rst rule implies targeted bene…ts aimed at those in proven need and providing assistance bene…ts. Under the second rule, all residents are entitled to basic security bene…ts which are usually established on a ‡at rate basis. The third rule consists of contribution based, corporatist bene…ts. Eligibility then requires some previous spell of employment and bene…ts are related to income (through the contributions). To these three rules, one could add mixed systems such as those where bene…ts depend on earlier contributions but also include a ‡at rate component.

Besides the bene…t rule, another feature of a social protection system is its size and particularly its relative size, compared to GDP. Table 1 shows how a number of EU countries can be characterized along theses two dimensions. Roughly speaking, targeted and basic social bene…ts are prevalent in Anglo-Saxon countries, where the overall size of programs is small. Bismarckian rules are applied in Continental Europe and particularly in Germany and France. In Nordic countries, social protection is traditionally generous and redistributive; they use mixed bene…t rules. Consequently, it appears

[1] See Cremer and Pestieau (2003) for a survey.
[2] See e.g., Esping-Andersen (1990).

	Redistribution (decreasing degree)			
	Targeted	Flat-rate	Mixed	Bismarckian
Size of social protection (increasing degree)	Anglo-saxon countries			
			Scandinavian countries	Germany France

Table 1: Classification of social protection systems according to size and redistribution.

that the European Union consists of welfare states with a wide variety of social insurance schemes.

In this paper, we focus on two rules: the flat rate benefit rule, also called Beveridgean and the earnings-related rule, also called Bismarckian. These are two polar cases with regard to the redistributive character of social protection systems. The Beveridgean rule is highly redistributive and achieves complete equalization of benefits. Under the Bismarckian system, on the other hand, no redistribution occurs.[3] The fundamental question we examine is whether a Beveridgean system can survive upon integration with a Bismarckian country. Put differently, we want to study whether Bismarck and Beveridge are compatible within a economic union.

While we are interested in their resistance to economic integration, one should keep in mind that different types of social protection have different

[3] Means testing is not explicitly introduced; in our simple setting (with only two types and without labor market distortions) it is not a relevant alternative. One can think of the means-tested rule as an even more extreme form of the Beveridgean one. Specifically, under means testing a flat benefits is given to families with income below a certain level. The results in Section 4 can then be interpreted as pertaining to a policy of targeting.

implications in a number of other aspects, namely efficiency, equity and political sustainability. A word on the literature dealing with these aspects can thus be useful.

The interplay between equity and efficiency in this context is by now well known. Consider the utilitarian case for the sake of illustration. When there is no efficiency loss full redistribution is optimal, and the Beveridgean rule appears to dominate. Efficiency costs are a first reason for not adopting a 100 % Beveridgean system; some relation between benefits and contributions can alleviate the distortionary effect of the taxes levied to finance the system. A second reason why even a utilitarian social planner would be in favor of a mitigated system is the need of political support. In short, by involving the middle class in the social protection system, it is possible to obtain its support in favor of rather generous programs; see Casamatta et al., (2000).[4] The benefit rule has also been shown to affect the equilibrium unemployment rate in the efficiency wage literature; see Goerke (1999). A further argument for a Bismarckian system is provided by Cremer and Pestieau (2000) and Casamatta et al., (2001) who study the reform of a (pay-as-you-go) retirement system following a demographic shock. They show that entitlements based on Bismarckian contributive taxes can protect the transition generations and ensure a smoother sharing of the burden of adjustment between generations.

Finally, there is the question, on which we focus in this paper, of the relative resistance of Bismarckian and Beveridgean systems when factors become mobile. This issue has been studied by Cremer and Pestieau (1998) in a setting where the size of social protection is determined through majority voting. However, these authors concentrate on symmetric settings where

[4] See also De Donder and Hindriks (1998).

all countries are of the same type. This setting is not appropriate to study integration of countries with di¤erent types of social protection systems. In this paper, we are interested in such asymmetric con…gurations which appear to be most relevant in reality; see Table 1.

Our paper also di¤ers from the bulk of tax competition literature[5] in that we explicitly allow for the possibility of corner solutions (for the migration equilibria). The existing studies typically concentrate on interior solutions. To achieve such an equilibrium they introduce some additional features like a public good, decreasing returns to scale or mobility cost. This, makes the results di¢ cult to interpret. In the current setting, we do not want to assume away corner solutions in order to get crisper results and to understand the impact of social insurance competition per se.

The conventional wisdom is that with factor mobility poor people have incentives to move towards Beveridgean countries. Consequently, Beveridgean regimes would not be sustainable; they would have to adapt or to perish. When private schemes are available, the dismantling of a Beveridgean system can be viewed as its substitution by a Bismarckian system. We show that mobility does have a signi…cant impact on social protection. However, the equilibrium patterns that can emerge are more complex and diversi…ed than the initial conjecture suggests. In some cases, the equilibrium may even imply that all the poor move to the Bismarckian country. Furthermore, the outcome of such a tax competition is shown to depend on the speci…c nature of the policy (purely redistributive or involving insurance) and the extent of coverage of social insurance. In addition, we argue that the type of mobility (the rich or poor) and the objective of national governments (concern for natives or residents) do have an impact on the social protection pattern that

[5] Recent surveys include Cremer et al. (1996), Wellig (2000), Hau‡er (2001), and Cremer and Pestieau (2003).

emerges under integration.[6]

In the main part of this paper, we assume that only the low income individuals move and that the social planner is only concerned by the utility of the natives. Alternative objectives and mobility pattern are discussed in Section 6.

2 Definitions and notation

Consider a simple setting with two countries indexed by α and β, for respectively Bism<u>a</u>rck and <u>B</u>everidge. They have different types of social protection systems characterized by the implied link between contributions and benefits. There are two types of individuals, indexed by $i = 1, 2$, who differ only in their wage, w_i, with $w_1 < w_2$. Each individual inelastically supplies one unit of labor. Consequently, there are no labor market distortions associated with taxation. When migration is allowed for, we have to distinguish the number of natives from the number of residents in each country. Let L_i^j denote the number of natives of type $i = 1, 2$ in country $j = \alpha, \beta$. We assume:

$$L_1^{\alpha} = L_2^{\alpha} = \delta; \qquad \text{and} \qquad L_1^{\beta} = L_2^{\beta} = 1.$$

In words, initially the proportion of each type of individuals is the same and equal to one half in both countries. The number of natives of either type in country β is normalized at one; it is equal to $\delta > 0$ in country α, where δ may differ from one.

[6] Some of Cremer and Pestieau (1998)'s results are also at odds with the conventional wisdom. For instance, they show that within a symmetric setting, Bismarckian systems do not necessarily resist to tax competition better than Beveridgean ones. However, they have no specific result for the case where the integration involves a Bismarckian and a Beveridgean country.

Assume that only individuals of type 1 are mobile and that there is no moving cost. Denote the number of residents of this type by N_1^j and observe that

$$0 \leq N_1^j \leq (1+\delta) \qquad\qquad j = \alpha, \beta.$$

When $N_1^j = (1+\delta)$, all the poor have moved to the considered country j.

Alternative settings will be considered in the subsequent sections. In all of them the same concept of migration equilibrium is used and it is therefore convenient to define this equilibrium up front and in a generic way. Denote the vector of instruments used in country j by P^j and the utility of type 1 individuals by:

$$\varphi_1^\alpha\left(P^\alpha, P^\beta, N_1^\alpha, N_1^\beta\right);$$

recall that $i = 1$ refers to the mobile poor. A migration equilibrium is given by:[7]

$$\tilde{N}_1^\alpha\left(P^\alpha, P^\beta\right) \quad \text{and} \quad \tilde{N}_1^\beta\left(P^\alpha, P^\beta\right)$$

such that

$$\tilde{N}_1^\alpha + \tilde{N}_1^\beta = (1+\delta); \qquad 0 \leq \tilde{N}_1^j \leq (1+\delta) \qquad \text{for} \qquad j = \alpha, \beta;$$

and

$$\varphi_1^\alpha\left(P^\alpha, P^\beta, \tilde{N}_1^\alpha, \tilde{N}_1^\beta\right) = \varphi_1^\beta\left(P^\alpha, P^\beta, \tilde{N}_1^\alpha, \tilde{N}_1^\beta\right) \qquad \text{(interior solution)}$$

or

$$\varphi_1^\alpha\left(P^\alpha, P^\beta, (1+\delta), 0\right) > \varphi_1^\beta\left(P^\alpha, P^\beta, (1+\delta), 0\right) \qquad \text{(corner solution in } \alpha\text{)}$$

[7] Our definition is based on the equilibrium concept used by Cremer and Pestieau, (1998).

or

$$\varphi_1^{\alpha}\left(P^{\alpha}; P^{\beta}; 0; (1+\delta)\right) < \varphi_1^{\beta}\left(P^{\alpha}; P^{\beta}; 0; (1+\delta)\right) \qquad \text{(corner solution in } \beta\text{)}.$$

The mobile individual considers the utility levels offered to him in both countries as given. An interior solution requires that these utility levels are equal. Alternatively, we can have a corner solution in which all the mobile individuals are in one of the countries but cannot gain by moving to the other country.

The different settings studied below differ, in particular, in the countries' strategic variables P^j's. In all cases, however, the payoffs (utility of each country social planner) are evaluated at the induced migration equilibrium. Furthermore, we shall determine the Nash equilibrium of the "tax competition" game. In other words, each country's strategy must be the best reply to the other country's strategy. Consequently, when a country envisions a variation of its policy, it considers the policy of the other country as given. However, it does anticipate the migratory adjustment which may be induced.[8]

We apply this concept to three settings: a pure redistributive scheme, a social insurance scheme where only the lower income individuals incurs a risk of income loss and a social insurance scheme concerning both types of individuals. The objective function in each country is the sum of utilities of the natives. This can imply that there is a utilitarian social planner or as in Wildasin (1991), that the higher wage individuals are in control and are altruistic. Observe that even though governments care only about natives,

[8] Formally, the equilibrium is defined exactly like in Cremer and Pestieau (1998). In most of the settings considered below the policy of one of the countries is exogenously given. Consequently, determination of the Nash equilibrium effectively reduces to the determination of one the other countries best reply.

we assume that it cannot discriminate between natives and immigrants when it comes to the implementation of its policies.

Throughout the paper, we focus on the case where there is a single country of each type. This is equivalent to a setting where there are several countries of each type who coordinate their policies. In the several country case, when countries of a given type do not coordinate, some results may change but the qualitative conclusions remain valid. We formally study the multiple country case in the …rst of the considered settings; see Subsection 3.2. In the other cases, this extension can be studied along the same lines and we shall only sketch its main implications.

3 Pure redistribution scheme

3.1 Basic model

Let us …rst consider a purely redistributive policy consisting of lump sum taxes and transfers. The social planner in each country has complete information. This setting can be interpreted in two di¤erent ways. The most straightforward interpretation is to assume that there is no risk of incurring a loss and, hence, no need for social insurance of any kind. Alternatively, one can think of this setting as representing a case of ex post mobility. In other words, individuals can move after the relevant random variable is realized. The poor in our model are then the individuals who have been unlucky (or in bad health) in the past.

With such a scheme, there is a lump-sum tax T_i which must balance the government's budget:

$$T_1^j N_1^j + T_2^j = 0:$$

By de…nition, in country ®; $T_i^{®} = 0$; the Bismarckian country does not redistribute. In country β; each individual has a strictly concave utility function $u(y_i^\beta)$ where y_i^β is disposable income: $y_1^\beta = w_1 + T_2^\beta / N_1^\beta$ and $y_2^\beta = w_2 - T_2^\beta$:

In this setting, where country α does not redistribute, the reservation utility for lower ability workers living in β is just $\bar{u}_1^\alpha = u(w_1)$, the utility of their counterparts in α. The strategy of the Bismarckian country is here exogenously given ($T_i^\alpha = 0$). To determine the "Nash equilibrium" it is then sufficient to determine country β's best reply to this strategy. To do so, we first have to consider the migration equilibrium induced by a given T_2^β. This yields the following results:

- When $T_2^\beta = 0$, there is a continuum of interior equilibria; $\hat{N}_1^\beta$ is undetermined and irrelevant for the country's objective.

- When $T_2^\beta > 0$ we have $\hat{N}_1^\beta = (1+\delta)$: a corner solution with all the poor living in β.

Observe that $T_2^\beta < 0$ (a transfer to the rich, implying a tax on the mobile poor) is not a feasible strategy. It would only be feasible for $\hat{N}_1^\beta > 0$; but this is impossible with $T_1^\beta > 0$. In words, a tax on the poor would make them worse off than in the Bismarckian country and they would all leave. Consequently, the subsidy to the rich cannot be financed.

We now consider the optimal choice of T_2^β given these migration equilibria. It can be determined by the maximization of:

$$\Omega = u\left(w_2 - T_2^\beta\right) + u\left(w_1 + \frac{T_2^\beta}{(1+\delta)}\right): \tag{1}$$

Observe that this expression is also valid for $T_2^\beta = 0$.[9] We obtain $T_2^\beta > 0$ if

$$\left.\frac{\partial \varpi}{\partial T_2^\beta}\right|_{T_2^\beta = 0} = -u'(w_2) + \frac{u'(w_1)}{(1+\delta)} > 0 \tag{2}$$

or

$$\frac{u'(w_1)}{u'(w_2)} > (1+\delta). \tag{3}$$

In that case, $T_2^\beta > 0$ is the solution of:

$$(1+\delta)u'\left(w_2 - T_2^\beta\right) = u'\left(w_1 + \frac{T_2^\beta}{(1+\delta)}\right). \tag{4}$$

The equilibrium implies a positive level of redistribution in the Beveridgean country which then attracts all the poor. Alternatively, if

$$\left.\frac{\partial \varpi}{\partial T_2^\beta}\right|_{T_2^\beta = 0} < 0$$

we have $T_2^\beta = 0$. Then there is no redistribution in either of the countries. The migration equilibrium is not uniquely determined, but it includes $N_1^\beta = 1$, that is no migration.

Let us now compare this equilibrium with the outcome in autarky. In the absence of mobility, there is full redistribution: $y_1^\beta = y_2^\beta$ and $T_2^\beta = (w_2 - w_1)/2$; recall that individuals have the same preferences, that the planner uses a utilitarian social welfare function, and that there are no labor market distortions. With mobility, we have either:

- Incomplete redistribution and all poor in the Beveridgean country: $T_2^\beta > 0$ but $y_2^\beta > y_1^\beta$ and $N_1^\beta = 1 + \delta$. There is redistribution in the Beveridgean country, but it does not result in a complete

[9] The migration equilibrium is not unique, but all equilibria give the same level of welfare.

equalization of income levels (unlike in the closed economy setting). This case occurs under condition (3), that is when w_1 and w_2 are suf…ciently di¤erent, when u is su¢ciently concave and when ± is not too large. All lower wage individuals are in country ¯ where there continues to be some redistribution. Redistribution is, however, less important than under autarky. This is because it is now more “costly” to redistribute. Every dollar collected from the rich is shared between the (1 + ±) poor, but only part of these (namely the natives) are accounted for in the social welfare function. For instance if ± = 1, only half of the tax revenues go to native poor. This ratio between resident poor and native poor acts like a price term in condition (4).

² No redistribution and no migration:[10] $T_2^{¯} = 0$. This case arises when (3) is violated: there is not much wage heterogeneity, utility is not too concave or ± is large. Redistribution is now too costly and the best strategy is to give up redistribution altogether.[11]

3.2 Variant with several countries of each type

Before proceeding let us brie‡y revisit the assumption that there is a single country of each type. Speci…cally, assume that there are J identical countries of type ¯ and K countries of type ®. Now we are dealing with a fully ‡edged Nash equilibrium (with strategy space $(T_1; T_2)$), which can no longer be determined by looking at the best reply of a single country.[12]

[10] Strictly speaking the migration equilibrium in not unique here. However, no migration is the only equilibrium if there is a positive (possibly in…nitesimal) moving cost.

[11] As a matter of fact, the Beveridgean country would now want to redistribute from the poor to the rich, but this is not possible because the mobile poor cannot be taxed.

[12] See conditions (15)–(17) of Cremer and Pestieau (1998) for a precise de…nition. Observe that because each country takes the other countries policy as given it e¤ectively takes the utility of the mobile households in the other jurisdictions as given.

The following property is useful to determine the types of equilibria that can arise: a situation where the poor are equally distributed between Beveridgean countries and where $\bar{T}_2 > 0$ cannot be an equilibrium.[13] To see this, observe that each of the countries would gain by “undercutting” the others, i.e. by inciting the poor to move to the other countries through a marginal change in policy (namely a reduction in taxes). This does not change the utility of the poor natives of the considered country but makes the rich better o¤. The same argument can be applied to any other situation where more than one Beveridgean country has poor residents. On the other hand, the case where a single Beveridgean country hosts all the poor can (potentially) be an equilibrium. The other Beveridgean countries have clearly no incentive to deviate, nor do the Bismarckian countries. The country who has the poor residents, on the other hand, faces exactly the same tradeo¤ as in the single Beveridgean country case above; in particular, all the other countries (whatever their type) o¤er $T_2 = 0$.

To sum up, when there are several countries who do not coordinate their policies, there are again two types of equilibria. The …rst type would imply all poor in a single Beveridgean country, i.e., $T_2 > 0$ for one of the Beveridgean countries and $T_2 = 0$ for all the others. The second type implies $T_2 = 0$ for all countries and is the exact counterpart to the “No redistribution and no migration” regime considered above.

The interesting feature is that the second type (no redistribution no migration) of equilibrium now e¤ectively becomes “more likely”. To see this observe that the welfare of the single Beveridgean country which hosts all the poor is now given by

[13] More formally: the migration equilibrium induced by the Nash equilibrium taxes can be interior only then $\bar{T}_2 > 0$ (i.e., when no redistribution occurs).

$$u\left(w_2 - T_2^{\beta}\right) + u\left(w_1 + \frac{T_2^{\beta}}{(J\delta + K)}\right);$$

which generalizes (1). Observe that $(J\delta + K)$ is the total number of poor in the economy. It then follows that the conditions for $T_2^{\beta} > 0$ is now given by

$$\frac{u'(w_1)}{u'(w_2)} > (J\delta + K):$$

Compared to (3), the presence of several countries thus increases the RHS of the expression, making the condition more stringent. This is not surprising. The single country which redistributes now attracts the poor not just from the Bismarckian countries, but also from the other Beveridgean countries. And the more countries there are, the more likely it becomes that the outcome for the redistributive Beveridgean country will be dominated by a no redistribution policy.

4 Social insurance of the poor

Let us now move from lump sum redistribution to social insurance and suppose that some individuals face the risk of losing their earning ability. We now assume that mobility (if any) takes place ex ante, that is before the realization of the risk.[14] In a first step, we assume that only the lower wage individuals incurs a such risk; consequently, they are the only ones who can benefit form social insurance. This may occur when the higher wage individuals have their own private insurance, but are forced to contribute to the public scheme. For simplicity, we assume that loss probability is given

[14] With ex post mobility, we would essentially return to the lump-sum setting, at least within our simple framework; see Sections 3 and 6 for additional discussion.

by $\pi = 1/2$. We introduce a social insurance paying a benefit equal to D and being financed by a proportional payroll tax τ.[15]

In country β, both types of workers contribute to the system so that:

$$\frac{N_1^\beta D}{2} = \left(\frac{N_1^\beta}{2} w_1 + w_2\right)\tau.$$

In country α, the lower wage individuals are the only contributors given the Bismarckian rule. Therefore, with our assumption that $\pi = 1/2$, the problem for the social planner reduces to maximizing:

$$2u_1^\alpha = u\left(w_1\left(1 - \tau_1^\alpha\right)\right) + u\left(\tau_1^\alpha w_1\right);$$

which yields, $\tau_1^\alpha = 1/2$ and $u_1^\alpha = u\left(w_1/2\right) = \bar{u}_1^\alpha$. This effectively implies that individuals have full insurance; consumption is the same in all states of nature. There is, however, no redistribution; consumption levels differ between types. Observe that the problem of country α is independent of the policy of country β. To determine the Nash equilibrium, it is then once again sufficient to calculate the best reply of β to a given strategy of country α, namely $\tau_1^\alpha = 1/2$, and for a given reservation utility level of the poor, $\bar{u}_1^\alpha$.

In country β, the payroll tax applies to all individuals at rate τ^β and social welfare can be written as:

$$U^\beta = u\left(w_2(1 - \tau^\beta)\right) + \frac{1}{2}\left[u\left(w_1(1 - \tau^\beta)\right) + u\left(\tau^\beta y(\tau^\beta)\right)\right];$$

where

$$y(\tau^\beta) = \frac{N_1(\tau^\beta) w_1 + 2w_2}{N_1(\tau^\beta)} \qquad (5)$$

is the tax base for financing social insurance, which is defined so that $D = \tau y$.

[15] Throughout the paper we assume that the number of residents per country is sufficiently large for the law of large numbers to apply. Consequently $1/2$ is not only the loss probability, but also the proportion of individuals who effectively incurs a loss.

We now show that two alternative outcomes are possible. The first possibility is that all low-wage people are in country β which offers a positive level of insurance (and redistribution). The second possibility is that country β sets its tax and social protection at zero, in which case all the poor move to the Bismarckian country. To achieve this we shall proceed by eliminating the other potential outcomes. First, we show that a solution implying an interior migration equilibrium is not possible.

Proposition 1 *A tax τ^β which induces an interior migration equilibrium, i.e., which is such that*

$$0 < \hat{N}_1^\beta\left(\tau^\beta\right) < 1 + \delta \tag{6}$$

cannot be the best reply of country β. Consequently, the Nash equilibrium tax rates necessarily induce a corner solution for the migration equilibrium.

Proof: First observe that (6) requires $\tau^\beta > 0$; when $\tau^\beta = 0$, the poor are necessarily better off in α. Given risk aversion, full insurance dominates no insurance. Next, (6) implies $u_1^\beta = \hat{u}_1^\alpha$. In other words, low productivity individuals in β have the same expected utility as their counterparts have in α. With u_1^β fixed, one has:

$$\frac{\partial U^\beta}{\partial \tau^\beta} = -u'\left(w_2(1-\tau^\beta)\right) w_2 < 0$$

and thus any $\tau^\beta > 0$ cannot be optimal. $\blacksquare$

The intuition behind this result is quite simple. Recall that the rich do not need any social insurance; the utility of the rich is thus maximized when the tax is zero. Now, when the migration equilibrium is interior, the utility level of the poor is effectively given; it is not affected by a marginal change in the tax rate. But then a decrease in the tax is always welfare improving.

We are thus left with two possibilities: either $\tau^\beta > 0$ with $N_1^\beta = 1 + \delta$ and all poor in Beveridge, or $\tau^\beta = 0$ with $N_1^\beta = 0$ and all poor in Bismarck.[16] We consider these two cases in turn.

- All poor in Bismarck: $N_1^\beta = 0$:

  In that case, $\tau^\beta = 0$; $u_1^\beta < u_1^\alpha$: Then social utility is:

$$U^\beta = u\,(w_2) + u\,(w_1/2)\,. \tag{7}$$

  Recall that government objective functions focus only on natives.

- All poor in Beveridge: $N_1^\beta = 1 + \delta$.

  In that case, the tax base is:

$$y(\tau^\beta) = w_1 + \frac{2}{(1+\delta)} w_2;$$

  and τ^β must be such that:

$$\frac{1}{2} u\left(w_1 (1 - \tau^\beta) \right) + \frac{1}{2} u \left(\tau^\beta \left(w_1 + \frac{2}{(1+\delta)} w_2 \right) \right) \geq u\,(w_1/2)\,. \tag{8}$$

  Inequality (8) states that the poor are effectively better off in country β than in α. It is always satisfied for $\tau^\beta = 1/2$. Let E be the set of all tax rates for which (8) is satisfied.

The tax rate applied in the Beveridgean country and the induced migratory solution can then be determined by comparing:

$$\begin{aligned} U_E^\beta = \; & \max_{\tau^\beta \in E} u\left(w_2 (1 - \tau^\beta) \right) + \frac{1}{2} u \left(w_1 (1 - \tau^\beta) \right) \\ & + \frac{1}{2} u \left(\tau^\beta \left(w_1 + \frac{2}{(1+\delta)} w_2 \right) \right) \end{aligned} \tag{9}$$

[16] One can easily show that $\tau^\beta = 0$ with $N_1^\beta = 1 + \delta$ cannot occur; with a zero tax in β the poor will not move to this country. Similarly, $\tau^\beta > 0$ with $N_1^\beta = 0$ cannot arise; when all the poor are in α there is no reason for the social planner in β to levy a positive tax.

and

$$U_0^{\beta} = u(w_2) + u(w_1/2):$$

When $U_E^{\beta} > U_0^{\beta}$, the Beveridgean country sets a tax rate such that it attracts all the poor. This is the outcome which is consistent with the initial intuition. However, when $U_E^{\beta} < U_0^{\beta}$, a more surprising equilibrium occurs. The Beveridgean country will now set a zero tax and thus offer no social insurance at all. All the poor then move to country α where they can get full insurance but do not benefit from any redistribution.

Observe that when τ^{β} is on the frontier of E, $\mathrm{Ñ}_1 = 0$ dominates $\mathrm{Ñ}_1 = 1 + \delta$: To get further insight, and to show that the two cases are effectively possible, consider the case of logarithmic utility. In that particular case, the value of τ^{β} that maximizes (9) is $1/4$. When $\delta = 1$ (the countries are of equal size) one easily checks that inequality (8) is always satisfied and that $U_E^{\beta} < U_0^{\beta}$ occurs if (and only if) $w_2 < 1.37 w_1$. This is quite an intuitive result. When the gap between the two levels of productivity is not large enough, the Beveridgean "social planner" finds it desirable to let its lower productivity citizens migrate to the Bismarckian country where at no cost they benefit from a self-financed complete insurance. Further observe that the range of wage differential for which this result occurs becomes larger as δ increase. This is because a larger level of δ makes it more costly to accommodate all the poor: U_E^{β} decreases (while U_0^{β} does not change).

This result is interesting as it indicates that with labor mobility all the lower productivity individuals do not necessarily reside in the Beveridgean country. It is dependent on the assumption that the higher productivity individuals do not benefit from social insurance. On the other hand, the result does not depend on the single Beveridgean country assumption.[17]

[17] With several countries the second type of equilibrium once again implies that all the

As a matter of fact, the larger the number of non-cooperating Beveridgean countries, the more costly it becomes for a single country to host all the poor. Consequently, it becomes more attractive to discourage the poor and incite them to move to another country.

5 Social insurance for all

Let us now turn to the case where both types of individuals, the rich and the poor, can incur a loss for which no, or at least no complete private insurance is available. We adopt the simplifying assumption that both types of individuals have the same probability of loosing their wage, namely $\pi = 1/2$. This does not change the behavior of country α which chooses a tax rate of $1/2$. This imposes a fixed utility to the lower ability individuals:[18]

$$u_1^{\alpha} = u\,(w_1/2) = \bar{u}_1^{\alpha}.$$

In country β the tax base is now given by

$$y(\tau^{\beta}) = \frac{\tilde{n}_1(\tau^{\beta})w_1 + w_2}{\tilde{n}_1(\tau^{\beta}) + 1}, \tag{10}$$

which replaces (5). The problem to be solved now is to maximize:

$$U^{\beta} = \frac{1}{2}\left[u\left(w_2(1-\tau^{\beta})\right) + 2u\left(\tau^{\beta} y\left(\tilde{n}_1(\tau^{\beta})\right)\right) + u\left(w_1(1-\tau^{\beta})\right)\right].$$

The major difference with the case studied in the previous section is that now an interior solution can no longer be ruled out. Specifically, the simple argument used in the proof of Proposition 1 does not go through here. When the utility of the poor is given, as is the case at an interior solution, the

poor live in a single Beveridgean country. Observe that the argument ruling out interior solutions (for migration) remains valid with several countries.

[18] The country now offers insurance to both types, but this is of no relevance for our analysis.

Beveridgean country would still like to "get rid" of its poor. However, it will no longer want to achieve this by setting a tax rate of zero for this would effectively deprive the skilled workers from insurance coverage. More generally, setting a tax which discourages the poor may now also be harmful to the rich. This does of course not imply that there will be necessarily an interior solution; however, this possibility now has to be accounted for.

To study the implication of this possibility, suppose that we have an interior solution such that $0 > \varphi_1\left(\tau^\beta\right) > 1 + \delta$. In that case, the utility of the lower ability workers must be equal to that of their counterparts in country α. Namely:

$$2u_1^\beta = u\left(w_1(1-\tau^\beta)\right) + u\left(\tau^\beta y - \varphi_1(\tau^\beta)\right) = 2u_1^\alpha.$$

With this constraint, one can rewrite the objective of the planner in the Beveridgean country, U^β, such that:

$$U_I^\beta = \frac{1}{2}\left[u\left(w_2(1-\tau^\beta)\right) - u\left(w_1(1-\tau^\beta)\right) + 4u_1^\alpha\right]; \qquad (11)$$

and the first-order condition is given by:

$$w_2 u'\left(w_2(1-\tau^\beta)\right) = w_1 u'\left(w_1(1-\tau^\beta)\right); \qquad (12)$$

where U_I^β denotes the level of utility in this interior case (I for interior).[19] Observe that (11) is valid only for tax rates which are such that the (migration) equilibrium is effectively interior. It is by choosing the tax rate that the Beveridgean government chooses the migration regime that will be relevant. To determine its best strategy, we then have to compare the maximum of (11), that is the best outcome amongst the interior solutions, to the utility

[19] The second order conditions here require more stringent restrictions than merely concavity. When they are not satisfied, an interior solution is not possible and we return the case where only corner solution have to be considered.

levels achieved at the two corner solutions, $N_1^\beta = 0$ and $N_1^\beta = 1 + \delta$.[20] Not surprisingly, the comparison is ambiguous at this level of generality. Depending on the parameter values and on the utility function both corner and interior solutions appear to be possible in general.[21]

To illustrate the choice of the optimal tax rate and the comparison of utility levels between regimes, let us return to the logarithmic utility. With this specification, one can easily see from (12) that U_I^β is independent of τ^β and is given by:[22]

$$U_I^\beta = \frac{1}{2}\left[\ln w_2 - \ln w_1 + 4\ln\frac{w_1}{2}\right]. \tag{13}$$

Consider now the two corner solutions. Keeping the logarithmic utility, it is straightforward to see that $N_1^\alpha = 0$ is effectively a special case of the interior solution regime. As to $N_1^\alpha = 1 + \delta$, one can easily show that the optimal tax rate is $\tau^\beta = 1/2$ and that the resulting utility level, denoted U_c^β (c for constraint) is equal to:

$$U_c^\beta = \frac{1}{2}\left[\ln w_2 + \ln w_1 + 4\ln\frac{1}{2} + 2\ln w_1\frac{(1+\delta) + w_2/w_1}{(2+\delta)}\right]. \tag{14}$$

Using (14) and (13) one shows that:

$$U_c^\beta - U_I^\beta = 2\ln\frac{(1+\delta) + w_2/w_1}{(2+\delta)} = 2\ln\frac{y(1/2)}{w_1} > 0, \qquad \text{for} \quad w_2 > w_1.$$

[20] What is relevant in both case it the maximum level of utility that can be achieved for a given value of N_1^β (namely 0 or $1 + \delta$) and with the tax rate restricted to yield the considered value of N_1^β as the migration equilibrium. When $N_1^\beta = 1 + \delta$, the problem is very similar to the one considered in the previous section. For $N_1^\beta = 0$, however, the solution is different; unlike in the previous section we do not obtain $\tau^\beta = 0$ there.

[21] The three types of solution continue to be relevant for the several country case. Nothing essentially changes if the solution is interior or if all poor move to Bismarckian countries. For the remaining case, we have again an equilibrium with all the poor in a single country and this outcome becomes less likely when there are several countries.

[22] This does not mean that welfare per se is independent of the tax rate. It merely means that all tax rates which yield an interior solution result in the same level of welfare.

Consequently, for the logarithmic preferences the optimal strategy is always to set a tax of 1=2, that is the preferred rate of either group under autarky. This induces an in‡ow of all the poor from the Bismarckian country which decreases the utility of the natives in the Beveridgean country. This country could avoid this immigration by setting a lower tax rate, but this proves to have an even larger adverse impact on welfare.

6 Extensions and concluding comments

Up to now, we have made several assumptions which may appear somewhat restrictive. We now discuss how restrictive they e¤ectively are. To do this we proceed in two steps. First, we sketch some extensions which we have considered but which are not reported in the main part of the paper. Second, we revisit some other assumptions which we have not relaxed.

We have considered the alternative speci…cations wherein the social planner is concerned by the utility of the residents and not by that of the natives. Basically, the nature of the results does not change. We show for the pure redistributive scheme that the most likely case is that all poor reside in the Beveridgean country. We have something which looks like the repugnant solution in population economics: the social planner prefers a large number of residents consuming little over a small number consuming a lot.

We have also considered the mobility of the rich. In this case, the problem is rather di¤erent. Typically there is then a single type of equilibrium in which all the rich locate in the Bismarckian country.

Let us now turn to the other assumptions and try to understand their impact even though we do not have formal results. First, by assuming …xed wages levels, we assume away any complementarity between the two types of labor. Clearly, this assumption allows for corner solutions.

Second our analysis was restricted to pure Bismarckian and Beveridgean systems. With encompassing bene…t rules such as studied by Cremer and Pestieau (1998), we contrast countries which are relatively more Bismarckian than others. The analysis then gets much more complex as we cannot rely on a …xed reservation utility that results from a pure Bismarckian regime.

Third, in the sections where social insurance is explicitly introduced we have assumed that individuals move ex ante, prior to disability and prior to paying taxes. As argued earlier, the lump-sum redistribution setting can be interpreted as a stylized setting of ex post mobility; see Section 3. However, in reality intermediate cases, where people who migrate already know something (but not everything) about their future earnings prospects, are probably the most relevant. One can hope that the pattern of equilibria achieved in the extreme cases, can provide us with some indication about the outcome in the intermediate case. However, to obtain more precise insight, one would need to consider a model much more sophisticated than ours and which incorporates some dynamic structure.

Finally, there is the assumption that the bene…t rule is given. We did so because we wanted to concentrate on one speci…c problem. In other words, our model is meant to be a building block of a more ambitious setup, encompassing a broader range of decision variables. Implicitly, we are thinking of a sequential decision process. Bismarckian systems on the one hand and Beveridgean systems on the other hand imply speci…c institutional and administrative arrangements which cannot be overturned in the short run. In countries like France and Germany, the Bismarckian system is solidly anchored in the tradition and concern not only the bene…t rule of social insurance but also the working of the labor market. For the UK, on the other hand, the Beveridgean tradition is also a strong part of the political and social life.

In earlier papers, we have discussed the choice of the benefit rule at an earlier, "constitutional", stage. Decision at this stage can be made either by a welfare maximizing authority or through a voting procedure. In either case, decisions in the first stage are contingent on the induced outcome in the second stage. Consequently, the characterization of the outcome for any given benefit rule, Bismarckian or Beveridgean, is a necessary step in the analysis. The difficult problem that we have not yet studied is why two countries end up choosing completely different benefit rules. We know that this is the case in reality. But theoretically, this is not a natural outcome except if we introduce explicitly given differences arising from, say, history.

Summing up, let us return to the conventional wisdom alluded to in the introduction. According to this view, when unskilled labor becomes more mobile, tax competition is enhanced and countries with Beveridgean social insurance will end up welcoming all the unskilled workers and hence effecting less redistribution than in the absence of labor mobility. In this paper, we have examined the validity of this conjecture within a simple model of tax competition and labor mobility between a purely Bismarckian country and a purely Beveridgean country. It is shown that mobility does have a significant impact on social protection and that the conventional wisdom is valid in a number of possible settings. However, the equilibrium patterns that can emerge are more complex and diversified than the initial conjecture suggests. In some cases, and in particular when the higher income people do not incur large risk or when they can self-insure, the equilibrium may even imply that all the poor move to the Bismarckian country. Then, the unskilled workers are insured but without cross-subsidization from the skilled workers.

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